

S/781/62/000/000/012/036

Heating of plasma by the acoustical . . .

Ya. B. Faynberg is credited with the choice of the topic and with the guidance of the investigation.

There are two references, of which the one by Berger et al. is the only one in English.

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S/781/62/000/000/013/036

AUTHOR: Faynberg, Ya. B., Shapiro, V. D.

TITLE: Waveguide properties of a plasma cylinder in a longitudinal magnetic field with account of thermal motion in the plasma

PERIODICAL: Fizika plazmy i problemy upravlyayemogo termoyadernogo sinteza; doklady I konferentsii po fizike plazmy i probleme upravlyayemykh termoyadernykh reaktsiy. Fiz.-tech. inst. AN Ukr. SSR. Kiev, Izd-vo AN Ukr. SSR, 1962, 66-70.

TEXT: The article is devoted to a kinetic-approximation investigation of electromagnetic oscillations of a plasma cylinder without account of collisions. This is unlike the previous investigations of the waveguide properties of a plasma cylinder in a magnetic field, which were made for the most part in the hydrodynamic approximation under various assumptions. Certain caution had to be exercised in the treatment of the boundary conditions, which assume very complicated form in the kinetic-theory solution. It was therefore assumed that the dimensions of the surface layer engendered by the thermal motion of the electrons and the ions are small compared with the wavelength. This essentially reduced the problem to a

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Waveguide properties of a plasma cylinder . . .

solution of Maxwell's equations within the volume of the plasma (medium with known dielectric tensor) and in vacuum with boundary conditions that specify a jump in the tangential component of the electromagnetic field in terms of the known jump of the gas-kinetic pressure. The cases in which terms with the gas-kinetic pressure can be of importance in the dispersion equation are then considered.

There are seven references, of which the English-language ones are those by T. Stix (Phys. Rev., 106, 1146, 1957 and Physics of Fluids 1, 308, 1958) and by Chandrasekhar, Kaufman, and Watson (Annals of Physics, USA, 2, 435, 1957).

Card 2/2

35104

S/135/62/007/001/014/014  
D299/D302

24.6716

AUTHORS: Shapiro, V.J., and Shevchenko, V.I.

TITLE: Effect of electrostatic instabilities on the distribution function of an electron beam which interacts with a plasma in a magnetic field

PERIODICAL: Ukrayins'kyy fizychnyy zhurnal, v. 7, no. 1, 1962, 83 - 86

ABSTRACT: Formulas are derived for the temperature variations and rectified velocity of an "almost mono-energetic" electron beam, interacting with a plasma in a magnetic field. These formulas are obtained by solving the equation for the distribution function  $f_0$ . This equation is obtained from the kinetic equation, by omitting the integral of pair collisions:

$$\frac{\partial f_0}{\partial t} - \frac{e}{mc} [\vec{v} \vec{H}_0] \frac{\partial f_0}{\partial v} - \frac{e}{m} \langle \vec{E}_1 \frac{\partial f_1}{\partial v} \rangle - \frac{e}{mc} \langle [\vec{v} \vec{H}_1] \frac{\partial f_1}{\partial v} \rangle = 0 \quad (1)$$

This integral is omitted, as fairly "fast" processes are considered. The case is considered of longitudinal axially-symmetric plasma oscillations.  
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S/185/62/007/001/014/014

Effect of electrostatic instabilities... D299/D302

cillations, in a plane perpendicular to the magnetic field. It is assumed that the plasma oscillations are linear and that  $f_0$  changes slowly with time, compared to the plasma oscillations. After transformations, one obtains from Eq. (1) the expression:

$$\frac{\partial f_0}{\partial t} = \frac{\partial}{\partial v_i} (\alpha_{ik} \frac{\partial f_0}{\partial v_k}), \quad (4)$$

where  $\alpha_{ik}$  is the tensor of the diffusion coefficients in velocity space,  $ik$  in the presence of the magnetic field. A formula is given for the tensor  $\alpha_{ik}$  for the case of instabilities due to the Vavilov-Cherenkov effect, and to the anomalous Doppler effect. By solving Eq. (4), one obtains formulas for the longitudinal- and transverse temperatures and for the rectified velocity of the beam. These formulas yield, in the case of a sufficiently rarefied plasma:

$$\frac{(\Delta T)_\parallel}{T_0} = \frac{1}{12\pi} \frac{\omega_H^2}{N_e u^2} \frac{e^2 D^2}{\epsilon}; \quad (7)$$

$$\frac{(\Delta T)_\perp}{T_0} \sim \frac{u}{\omega_H^2 N_e} \frac{(\Delta T)_\parallel}{T_0} \ll \frac{(\Delta T)_\parallel}{T_0}; \quad mu \ll u; \quad \mu \ll T_0$$

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SHAPIRO, V.D.

Diffusion in an inhomogeneous rarefied plasma induced by the  
excitation of "ion-acoustic" oscillations. Ukr. fiz. zhur. 7  
no.10:1033-1045 O '62. (MIRA 16:1)

1. Fiziko-tekhnicheskiy institut AN UkrSSR, Khar'kov.  
(Plasma oscillations) (Diffusion)

38860

S/056/62/042/006/017/047  
B104/B102

24.6716

AUTHORS: Shapiro, V. D., Shevchenko, V. I.

TITLE: The nonlinear theory of the interaction of beams of charged particles with a plasma in a magnetic field

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 42, no. 6, 1962, 1515-1528

TEXT: The changes of temperature and the directed velocity of a beam of charged particles on interaction with an electron plasma in an external magnetic field is investigated in the "quasilinear" approximation. The investigation is limited to the initial stage of the process, where the oscillation amplitudes are small and the time variation of the beam parameter causes no significant change of the dispersion coefficients. During this time the amplitude increases linearly as in the linear theory. An equation is derived which describes the change of the initial nonequilibrium distribution function of the beam and of the plasma as being due to interaction with the plasma oscillations. The changes in the mean values of the velocity and the temperature caused by the Cherenkov effect, Card 1/2

The nonlinear theory of the ...

S/056/62/042/006/017/047  
B104/B102

and by the normal and anomalous Doppler effects are determined.

ASSOCIATION: Fiziko-tekhnicheskiy institut Akademii nauk Ukrainskoy SSR  
(Physicotechnical Institute of the Academy of Sciences  
Ukrainskaya SSR)

SUBMITTED: September 20, 1961 (initially)  
March 14, 1962 (after revision)

X

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ACCESSION NR: AT4036074

S/2781/63/000/003/0318/0332

AUTHOR: Shapiro, V. D.

TITLE: Diffusion due to excitation of "ion-acoustic" oscillations in an inhomogeneous rarefied plasma

SOURCE: Konferentsiya po fizike plazmy\* i problemam upravlyayemogo termoyadernogo sinteza. 3d, Kharkov, 1962. Fizika plazmy\* i problemy\* upravlyayemogo termoyadernogo sinteza (Plasma physics and problems of controlled thermonuclear synthesis); doklady\* konferentsii, no. 3. Kiev, Izd-vo AN UkrSSR, 1963, 318-332

TOPIC TAGS: plasma diffusion, plasma oscillation, diffusion coefficient, kinetic theory, transport property, plasma ion oscillation, plasma magnetic field interaction, distribution statistics

ABSTRACT: An approximate theory, which takes into account the influence of oscillations on transport phenomena in the plasma (V. D.

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ACCESSION NR: AT4036074

Shapiro, IVUZ. Radiofizika v. 4, 5, 1961) is used to estimate the diffusion coefficient in an inhomogeneous plasma, due to the buildup of "ion-acoustic oscillations." The diffusion is analyzed both at the initial stage of development of the oscillations, and also for the stationary oscillations. The analysis is limited to high-temperature and rarefied plasma without pair collisions. An unbounded inhomogeneous plasma in a magnetic field parallel to the  $z$  axis is considered. The kinetic equation is solved by expansion in the reciprocal of the magnetic field and the equation for the variation of the distribution function of the background due to the excitation of the oscillations is obtained by averaging. The stationary amplitudes of the ion acoustic oscillations are determined and are found to be small, thus confirming the validity of the quasilinear approximation. The diffusion coefficients of the electrons and ions, due to the ion acoustic oscillations, are found to be of the same order of magnitude at the saturation stage. It is concluded that the ion acoustic oscillations lead to an additional diffusion of the elec-

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ACCESSION NR: AT4036074

trons and ions of the plasma transversely through the magnetic field, but this diffusion is small. In view of the smallness of this contribution to the total diffusion, other possible mechanisms of anomalous diffusion become significant and worthy of study. "The author is indebted to Ya. B. Faynberg for suggesting the topic and guidance and to A. I. Akhiezer for a discussion of the results." Orig. art. has: 40 formulas.

ASSOCIATION: None

SUBMITTED: 00

DATE ACQ: 21May64

ENCL: 00

SUB CODE: ME

NR REF SOV: 005

OTHER: 005

Card 3/3

SHAPIRO, V.D.

Nonlinear theory of the interaction of "monoenergetic"  
beams and a plasma. Zhur. eksp. i teor. fiz. 44 no.2:613-  
625 F '63. (MIRA 16:7)

1. Fiziko-tekhnicheskii institut AN UkrSSR.

SHAPIRO, V.D.; SHEVCHENKO, V.I.

Quasi-linear theory of the instability of a plasma with  
anisotropic ion velocity distribution. Zhur. eksp. i teor. fiz.  
45 no.5:1612-1624 N '63. (MIRA 17:1)

SHAPIRO, V.D.

Nonlinear theory of charge density waves in beams with variable parameters. Izv.vys.ucheb.zav.; radiofiz. 7 no.4:736-746 '64.

(MIRA 18/1)

1. Fiziko-tekhnicheskiy institut AN UkrSSR.

ACCESSION NR: AP4028969

8/0057/64/034/004/0764/0767

AUTHOR: Tsy\*tovich, V.N.; Shapiro, V.D.

TITLE: On the interaction of an electron beam with an optically active medium

SOURCE: Zhurnal tekhnicheskoy fiziki, v.34, no.4, 1964, 764-767

TOPIC TAGS: electron beam plasma interaction, electron beam laser pumping, laser

ABSTRACT: The interaction of an electron beam with an optically active gas is discussed. It is found that considerable power can be generated in the visible and ultraviolet regions even when the density of the beam is small compared with that of the medium and the Langmuir frequency is small compared with the optical resonance frequency. It is suggested that electron beams might be useful for laser pumping. Powers of the order of  $10^2$  kW/cm<sup>3</sup> at a frequency of  $6 \times 10^{16}$  cycles/sec can be developed by a beam of  $10^{14}$  electrons/cm<sup>3</sup> having velocities of  $3 \times 10^9$  cm/sec in a medium of density  $10^{19}$  cm<sup>-3</sup>. The medium is treated as an ensemble of oscillators, and expressions are derived for the power developed and the velocity dispersions required of the exciting beam. The condition for the applicability of the quasi-linear approximation employed is given, and a future treatment of the non-linear terms is

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ACCESSION NR: AP4028969

promised. The equation for the (negative) damping constant of the oscillations, on which all the calculations are based, is simply written without derivation or reference. "In conclusion, the authors express their gratitude to Ya.B.Faynberg and M.S.Rabinovich for valuable advice." Orig.art.has: 9 formulas.

ASSOCIATION: Fizicheskiy institut im.P.N.Lebedeva, Moscow (Physical Institute)

SUBMITTED: 10Nov63

DATE ACQ: 28Apr64

ENCL: 00

SUB CODE: PH

NR REF SOV: 001

OTHER: 001

Card 2/2



L 4242-66 EWT(1)/EWT(m)/ETC/EPF(n)-2/EWG(m)/EPA(w)-2/EWA(m)-2 IJP(c)

ACCESSION NR: AT5007973 GS/AT/JXT

S/0000/64/000/000/1023/1029

AUTHOR: Berezin, A. K.; Berezina, G. P.; Bolotin, L. I.; Gorbatenko, M. F.;  
Yegorov, A. M.; Zagorodnov, O. G.; Kornilov, B. A.; Kurilko, V. I.; Lutsenko, Ye.  
I.; Laypkalo, Yu. M.; Pedenko, N. S.; Kharchenko, I. F.; Shapiro, V. D.;  
Shevchenko, V. I.; Faynberg, Ya. B.

TITLE: Acceleration of charged particles with the aid of longitudinal waves in  
plasma and plasma waveguides

SOURCE: International Conference on High Energy Accelerators. Dubna, 1963.  
Trudy. Moscow, Atomizdat, 1964, 1023-1029

TOPIC TAGS: high energy accelerator, electron beam, plasma accelerator, plasma  
waveguide

ABSTRACT: Plasma waveguides and noncompensated electron and ion beams can be uti-  
lized as accelerating systems in linear accelerators (Faynberg, Ya. B., Symposium  
CERN 1, 84 1956); *Atomnaya energiya* 6, 431 (1959)). In such systems, slow elec-  
tromagnetic waves  $v \ll c$  are propagated, which are necessary for particle accelera-  
tion. The waveguide properties of restrained plasma and noncompensated beams are  
displayed in the case of waves in the meter and centimeter range even for com-  
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ACCESSION NR: AT5007973

paratively small plasma densities around  $10^9$  to  $10^{13}$   $\text{cm}^{-3}$ ). Under these conditions the high-frequency energy losses during wave propagation, which are due to the collisions of plasma particles, are small. The density of electrons in metals (about  $10^{23}$ ) is many orders greater than is necessary for ensuring waveguide properties in the microwave range. This leads to great losses of high-frequency power during wave propagation in metallic conductors. For plasma densities around  $10^9$  to  $10^{13}$   $\text{cm}^{-3}$ , the energy losses during particle transit through the plasma, which are proportional to plasma density, are insignificant, from  $10^{-5}$  to  $10^{-6}$   $\text{ev/cm}$ . This means that plasma waveguides are "transparent" for accelerated particles. According to the conditions of acceleration the particles are divided into individual bunches. Thus the loss of particles moving in the plasma can increase greatly because of the occurrence of coherent deceleration representing the inverse of the effect of coherent acceleration, which was established by V. I. Veksler (Symposium CERN 1, 80 (1956)). However, even for accelerated particle fluxes of the order of tens of amperes, these losses are all insignificant. Because waveguide properties are determined by the plasma, the metal surfaces can be remote from regions with large field strengths or eliminated altogether, which permits a significant increase in the permissible voltages of the accelerating fields and a substantial de-

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ACCESSION NR: AT5007973

crease in the high-frequency energy losses. It is also important to concentrate the electromagnetic energy in the radial direction only in the regions where the accelerated particles are moving. Thus for a given field strength the electromagnetic energy flux decreases markedly. If the fluxes of accelerated particles are large, the waveguide properties necessary for acceleration can be ensured by the particles of the beam which are not entrapped in the acceleration process, through which particles the entrapped particles move. The beam itself which is injected into the accelerator operates under these conditions of an accelerating system. To clarify the possibilities of particle acceleration by means of electromagnetic waves excited by charged particle beams, and also to investigate the influence of beam instabilities upon the acceleration process, the Physicotechnical Institute, Academy of Sciences Ukrainian SSR conducted theoretical and experimental investigations on the interaction of charged particle beams with a plasma. These investigations were intended to lead to, not the design and construction of a definite accelerator model, but the physical processes occurring during the interaction under consideration, and in this way to a determination of the possibilities of plasma methods of acceleration which are being developed at this institute. The theory developed up to the present time of the interaction between beams and plasma has been essentially a linear theory. As a result of the work of V. D. Shapiro and V.

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I. Shevchenko at this institute for the case of beams of not very large density, a nonlinear theory has been created which permits one to trace the process of interaction of an initially nonmodulated beam and mono-energetic beam with a plasma from the initial stage to saturation. As is shown, a large part of the beam's energy of ordered motion (75% of its initial energy) is lost by the beam as a result of collective interactions with the plasma. Thus the energy expended upon excitation of oscillations amounts to 30%; upon increasing the thermal energy of the plasma, to 30%; and upon increasing the thermal energy of beam, to 15%. The experimental investigations of this interaction were carried out by I. F. Kharchenko and A. K. Berezin and their respective co-workers. Their results are in agreement with the theory of M. F. Gorbatenko. The mentioned institute has also carried out further theoretical and experimental investigations on the problems of electromagnetic wave propagation in plasma waveguides excited by high-frequency wall sources. The experimental studies, by O. G. Zagorodnov, et al., showed that the results agree well with theory under conditions of insignificant nonlinear effects. Current experiments are concerned with highly-ionized plasmas with density  $10^{11}$  to  $10^{12}$ . Orig. art. has: 4 figures, 1 table.

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L 4242-66

ACCESSION NR: AT5007973

ASSOCIATION: Fiziko-tekhnicheskiy Institut AN UkrSSR (Physicotechnical Institute,  
AN UkrSSR)

SUBMITTED: 26May64

ENCL: 00

SUB CODE: NP

NO REF SOV: 005

OTHER: 001

Card 5/5

L 08808-67 EWT(1) IJP(c) AT/GD  
ACC NR: AT6020440 (✓)

SOURCE CODE: UR/0000/65/000/000/0103/0111

AUTHOR: Gorbatenko, M. F.; Shapiro, V. D. 54

ORG: none

TITLE: Quasilinear theory of the interaction of bounded beams and a plasma in a strong magnetic field

SOURCE: AN UkrSSR. Vzaimodeystviye puchkov zaryazhennykh chastits s plazmoy (Interaction of charged particle beams with plasma). Kiev, Naukova dumka, 1965, 103-111

TOPIC TAGS: plasma beam interaction, plasma instability, strong magnetic field

ABSTRACT: Utilizing the results of V. D. Shapiro and V. I. Shevchenko in ZhETF, 1962, 45, 1515, the development of instabilities during the interaction of a low density cylindrical beam with a plasma is investigated by including the nonlinear approximations. The boundary condition on the plasma is taken to be a conducting wall and the plasma is contained by a strong magnetic field. First, the interaction of plasma with a uniform beam with small thermal spread is considered. It is shown that in this case, quasilinear theory can be applied when the amplitude of excitation becomes great. Next, a beam with great thermal energy component is analyzed. The dispersion relation for this case yields the amount of change of thermal energy of the beam. This, in turn, shows that most of the directed energy of the beam is converted into plasma thermal

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L 08808-67

ACC NR: AT6020440

energy. In the case considered here, the deceleration of the beam and excitation of oscillations are derived and shown to be much longer than in the unbounded case if certain parameters are satisfied. The instability development is traced through the saturation phase and the establishment of a stationary state. Orig. art. has: 25 formulas.

SUB CODE: 20/      SUBM DATE: 11Nov65/      ORIG REF: 011

Card 2/2      net

L 08227-67 EWT(1) IJP(c) GG/AT

ACC NR: AP6030921 SOURCE CODE: UR/0207/66/000/004/0048/0055

AUTHOR: Tsyтовich, V. N. (Moscow); Shapiro, V. D. (Khar'kov)

ORG: none

TITLE: Nonlinear theory for the passage of pulses of electromagnetic waves  
through a plasma boundary

SOURCE: Zhurnal prikladnoy mekhaniki i tekhnicheskoy fiziki, no. 4, 1966, 48-55

TOPIC TAGS: wave pulse, electromagnetic wave, transverse wave, longitudinal wave, plasma, plasma boundary, boundary effect

ABSTRACT: The role of boundary effects is investigated for the passage of pulses of electromagnetic waves through a plasma boundary. Cases of narrow and wide spectra are analyzed. Stochastic phases of transverse waves and generated longitudinal waves are assumed. The boundary effects may be used to generate longitudinal waves needed for the effective acceleration of particles in the plasma as well as for the modulation and changing of the spectrum of initial transverse waves. The application of boundary effects in diagnostics of turbulent plasma is pointed out. The authors thank Ya. B. Faynberg, M. S. Rabinovich, I. S. Danilkin,

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L 08227-67

ACC NR: AP6030921

and M. D. Rayzer for their interest in the work and valuable comments. Orig.  
art. has: 5 figures and 37 formulas.

SUB CODE: 20/ SUBM DATE: 09Mar65/ ORIG REF: 006/ OTH REF: 001/

Card 2/2 *egh*

L 08810-67 EWT(1) IJP(c) AT/GD  
ACC NR: AT6020438 (V)

SOURCE CODE: UR/0000/65/000/000/0069/0092

AUTHOR: Faynberg, Ya. B.; Shapiro, V. D. 52

ORG: none

TITLE: Quasilinear theory of excitation of oscillations during the injection of an electron beam into a semi-infinite plasma

SOURCE: AN UkrSSR. Vzaimodeystviye puchkov zaryazhennykh chastits s plazmoy (Interaction of charged particle beams with plasma). Kiev, Naukova dumka, 1965, 69-92

TOPIC TAGS: electron beam, plasma beam interaction, plasma oscillation

ABSTRACT: The aim of the present work is to explain the spatial dependence of electric fields occurring in a plasma upon which the electron beam is incident. The spatial anisotropy arises due to the finite extent of plasma and the beam, features not considered in theoretical problems of this sort. Here a semi-infinite plasma is considered and the region near the boundary is studied for the case of a beam with an electron velocity much greater than the group velocity of plasma oscillations. Vlasov's equation for collisionless parameters is written to describe noise fields. It is examined in the linear approximation and applied in the derivation of the spatial dependence of the fields. It is shown that the total energy density of the excited oscillations can greatly exceed the directed kinetic energy of the beam, indicating ag-

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'L 08810-67

ACC NR: AT6020438

gregation of energy near the plasma boundary. As the field intensity in this region is increased, relaxation occurs more rapidly and the boundary layer becomes narrower. A uniform beam is also considered; it is shown to generate a double boundary layer, when sufficient time has elapsed. The dimensions of such a layer are computed and it is shown that the second peak is the more intense. Orig. art. has: 68 formulas.

SUB CODE: 20/

SUBM DATE: 11Nov65/

ORIG REF: 011/

OTH REF: 002

Corrd 2/2 nst

L 08809-67 EWT(1) IJP(c) AT/GD  
 ACC NR: AT6020439 (N) SOURCE CODE: UR/0000/65/000/000/0092/0103

AUTHOR: Faynberg, Ya. B.; Shapiro, V. D.

ORG: none

TITLE: On the nonlinear theory of the interaction of a relativistic beam and a plasma

SOURCE: AN UkrSSR. Vzaimodeystviye puchkov zaryazhennykh chastits s plazmoy (Interaction of charged particle beams with plasma). Kiev, Naukova dumka, 1965, 92-103

TOPIC TAGS: plasma beam interaction, plasma instability, strong magnetic field, kinetic equation, electron beam

ABSTRACT: The dynamics of the development of instability appearing during the interaction of a relativistic uniform beam of electrons with a plasma is investigated from the initial phase through the saturating phase and the formation of a stationary spectrum of oscillations. It is assumed that the plasma is in strong magnetic field parallel to the beam direction and that the beam density is much smaller than the plasma density. The excited waves are considered to be one-dimensional and moving parallel to the beam. The kinetic equation and field equations are analyzed for several degrees of nonlinearity. It is shown that beam acceleration occurs at the expense of increasing the thermal spread of the beam and the kinetic and potential energy of the induced oscillations. For larger values of beam velocities, the instability leads to a second

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L 08809-67

ACC NR: AT6020439

quasilinear phase. At lower values, the beam remains uniform. The analysis also brings out the existence of a strong oscillating additive term in such beam characteristics as density and momentum. Orig. art. has: 31 formulas.

SUB CODE: 20/

SUBM DATE: 11Nov65/

ORIG REF: 006/

OTH REF: 002

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nst

L 08807-67 EWT(1) IJP(c) AT/GD  
ACC NR: AT6020441 (N)

SOURCE CODE: UR/0000/65/000/000/0111/0115

AUTHOR: Tsyтовich, V. N.; Shapiro, V. D.

58

ORG: none

TITLE: The interaction of an electron beam with an optically active medium

SOURCE: AN UkrSSR. Vzaimodeystviye puchkov zaryazhennykh chastits s plazmoy (Interaction of charged particle beams with plasma). Kiev, Naukova dumka, 1965, 111-115

TOPIC TAGS: electron beam, plasma resonance, plasma interaction, plasma density

ABSTRACT: The generation of oscillations in the visible and UV ranges is considered theoretically in the interacting system of a beam and an optically active plasma. The electron beam is of smaller density than the plasma and has a large thermal component. The plasma frequency is much smaller than that of the most rapidly growing harmonic, which is about equal to the characteristic frequency of the plasma. The spectrum of oscillations excited in the plasma is obtained from the quasilinear theory. At resonance, nearly all the energy of the beam goes into the kinetic energy of oscillators (i. e., atoms or ions of the plasma) exceeding the collisional transfer of energy to a large degree. A numerical example is given to show that very strong generation of light by this method is possible. It is shown that a beam with a density of  $10^{14} \text{ cm}^{-3}$  and a particle velocity of  $3 \cdot 10^9 \text{ cm/sec}$  injected into a plasma with a density of  $10^{19}$

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L 08807-67

ACC NR: AT6020441

$\text{cm}^{-3}$  will generate  $100 \text{ kw/cm}^3$  of power at  $10^{16} \text{ sec}^{-1}$  angular frequency (i. e., in the ultraviolet). Orig. art. has: 9 formulas.

SUB CODE: 20/

SUBM DATE: 11Nov65/

ORIG REF: 002

Card 2/2    nst

L 07401-67 EMT(1) IJP(c) GD/AT  
ACC NR: AT6020578 (N)

SOURCE CODE: UR/0000/65/000/000/0156/0164

AUTHOR: Shapiro, V. D.; Shevchenko, V. I.

ORG: none

TITLE: On the induced dispersion of Langmuir oscillations of a plasma in strong magnetic field

SOURCE: AN UkrSSR. Vysokochastotnyye svoystva plazmy (High frequency properties of plasma). Kiev, Naukovo dumka, 1965, 156-164

TOPIC TAGS: plasma oscillation, plasma resonance, plasma magnetic field

ABSTRACT: Nonlinear interaction of wave harmonics in the long wavelength range of the spectrum is investigated for the conditions of a strongly magnetized plasma. The linear damping of the waves is considered small due to the small number of resonance particles and all oscillations are along the field lines. The mathematical description of the system employs a set of equations for the electron and ion distribution functions and for the electric field. The system is analyzed in the second and third approximation starting with linear solutions. The initial one-dimensional spectrum remains nearly uniform under the action of dispersive effects and is seen to correspond within a cosine factor to the one-dimensional model. The interaction between waves leads to pumping of energy from the higher frequency part of the spectrum to the lower. The

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L. G. D. 1-6

ACC NR: AT6020579

dissipation of wave energy by plasma particles is considerably smaller than loss of energy to lower frequency waves. Orig. art. has: 18 formulas.

SUB CODE: 20/ SUBM DATE: 19Nov65/ ORIG REF: 006/ OTH REF: 001

Card 2/2 *pla*

DRIVING, A.Ya., inzh.; SHAPIRO, V.D.

Effect of the method used in assembling a frame structure on the  
stressed state of its elements. From. stroi. 42 no.8:40-41 '65.  
(MIRA 18:9)

L 13956-65 EWT(1)/EPA(sp)-2/ENG(k)/T/EEC(t)/EPA(w)-2/EEC(b)-2/EWA(m)-2 Po-4/  
Pz-6/Pab-10/P1-4 IJP(c)/AFWL/ASD(f)-2/ASD(a)-5/ASD(p)-3/ESD/SSD(b)/SSD/AEDC(b)/  
ASD(d)/AFETR/RAEN(a)/ESD(gs)/ESD(t) AT S/0056/64/047/004/1389/1404

ACCESSION NR: AP4047907

AUTHOR: Faynberg, Ya. B.; Shapiro, V. D.

TITLE: Quasi-linear theory of oscillation excited by an electron beam injected into a plasma halfspace

SOURCE: Zhurnal eksperimental'noy teoreticheskoy fiziki, v. 47, no. 4, 1964, 1389-1404

TOPIC TAGS: plasma, plasma instability, instability, plasma oscillation, electron beam, beam instability

ABSTRACT: The spatial distribution of the electric fields of oscillations excited by an electron beam injected into a semi-infinite plasma with directed velocity considerably greater than the thermal velocity of plasma electrons is theoretically investigated. In investigating the development of instabilities, particular attention was paid to the nonlinear interaction stage. Two cases were considered: the development of instability during injection of a mono-energetic beam into plasma and during injection of a beam with a

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strongly washed-out velocity distribution function. Since the main aim was the study of the time-dependent formation of transitional layers at the plasma boundaries, only nonstationary and nonhomogeneous solutions of quasi-linear equations were considered. It was shown that two layers with high field intensity, corresponding to the two stages in the formation of instability, are produced during injection of a monoenergetic beam. The energy lost by the beam in excitation of oscillations is stored in the second narrow layer at the plasma boundary in which relaxation of the beam takes place. The oscillation energy density in this layer greatly exceeded the beam energy density. Orig. art. has: 59 formulas and 2 figures.

ASSOCIATION: Fiziko-tekhnicheskiy institut Akademii nauk Ukrainskoy SSR (Physicotechnical Institute, Academy of Sciences, UkrSSR)

SUBMITTED: 21Mar64

ENCL: 00

SUB CODE: NP, ME

NO REF SOV: 011

OTHER: 001

ATD PRESS: 3137

Card

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I 8218-66 EWT(1)/EWG(m) IJP(c) AT

ACC NR: AT5022301

SOURCE CODE: UR/3137/64/000/076/0001/0014

AUTHOR: <sup>44,55</sup> Tsytovich, V. N.; <sup>44,55</sup> Shapiro, V. D. B-5

ORG: <sup>44,55</sup> Academy of Sciences UkrSSR, Physicotechnical Institute (Akademiya nauk UkrSSR, Fiziko-tekhnicheskiy institut)

TITLE: Nonlinear stabilization of plasma beam instabilities

SOURCE: AN UkrSSR. Fiziko-tekhnicheskiy institut. Doklady, no. 076/P030, 1964.  
Nelineynaya stabilizatsiya puchkovykh neustoychivostey plazmy, 1-14

TOPIC TAGS: plasma beam, plasma wave, <sup>21,44,55</sup> plasma instability

ABSTRACT: The possibility of the stabilization of beams in plasmas is discussed, especially for the case where ion temperature greatly exceeds the electron temperature. The chief mechanism responsible for limiting beam or stream instabilities is wave scattering by a large number of ions. The problem is discussed in terms of the spectral shift of the plasma waves from the resonant to nonresonant regions. If the shift occurs in a period less than or of the order of the time of growth of the waves, then stabilization occurs. This occurs in some instances without the presence of strong external noise. General stability criteria are derived from the nonlinear kinetic equations for the beams with large velocity spread. It is shown that the small velocity spread leads to a modified criterion of instability where the electron thermal velocity exceeds that of the ions. Orig. art. has: 56 formulas.

SUB CODE: 20/ SUBM DATE: 00/ ORIG REF: 012/ OTH REF: 000

Cord 1/1

L. 08806-67 EWT(1) IJP(c) AT/GD  
ACC NR AT6020442 (N) SOURCE CODE: UR/0000/65/000/000/0115/0130

AUTHOR: Tsyto~~ovich~~, V. N.; Shapiro, V. D. 49

ORG: none

TITLE: Nonlinear stabilization of plasma beam instabilities

SOURCE: AN UkrSSR. Vzaimodeystviye puchkov zaryazhennykh chastits s plazmoy (Interaction of charged particle beams with plasma). Kiev, Naukova dumka, 1965, 115-130

TOPIC TAGS: plasma beam interaction, plasma instability, nonlinear plasma, plasmon

ABSTRACT: The study of plasma and interacting beam parameters shows that the stabilization of beams by nonlinear means is possible. The mechanism investigated in this connection is the pumping of excited oscillations into a nonresonant spectral region. It is assumed that the characteristic time of pumping is shorter than the instability development time, thus keeping the energy of the waves low. The spectral density time behavior is obtained by deriving the cross section for dispersion of Langmuir waves on the plasma particles. This is done both by use of the theory of growing amplitude excitations as well as by the quantum-mechanical approach (plasmons). The effects of nonlinearities are obtained from the dynamics of beam instabilities. It is shown that the beam can be accelerated by the excitation of internal electric fields. The analy-

Card 1/2

L 08806-67

ACC NR: AT6020442

0

sis carried out in this work shows qualitatively that stabilization is possible in the absence of intense external noise. Orig. art. has: 39 formulas.

SUB CODE: 20/

SUBM DATE: 11Nov65/

ORIG REF: 010/

OTH REF: 001

Co. 2/2 nst

L 04751-57 BT(1) IOP(c) AT/EX  
ACC NR: AT6020445 (N)

SOURCE CODE: UR/0000/65/000/000/0143/0155

AUTHOR: Faynberg, Ya. B.; Shapiro, V. D.

ORG: none

TITLE: Interaction between a modulated beam and a plasma

SOURCE: AN UkrSSR. Vzaimodeystviye puchkov zaryazhennykh chastits s plazmoy (Interaction of charged particle beams with plasma). Kiev, Naukova dumka, 1965, 143-155

TOPIC TAGS: hydrodynamics, plasma density, plasma beam interaction

ABSTRACT: The beam instability of a modulated beam traversing a plasma in the self-consistent field approximation is investigated. A system of hydrodynamic equations is solved for the electric field, particle velocity and density in terms of one another by assuming the harmonic time dependence for these quantities. The density is assumed to be governed by thermal distribution in the beam, so that the oscillations propagate not only due to the presence of directed energy particles but also because of particles of the plasma. The resulting fourth order equations are split into two sets of second order equations, assuming that the normalized electric field is much less than unity. These equations then completely determine beam density distribution assuming the absence of surface charge on the beam boundary. The solution indicates that electric field change in moving through the modulated beam is given by plasma density

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ACC NR: AT6020445

alone and not by beam density. Neglecting small terms, the plasma particle velocity change is also obtained. The conditions of instability are restrictive so that the possibility of beam stabilization by resorting to modulation is feasible. Orig. art. has: 37 formulas.

SUB CODE: 20/

SUBM DATE: 11Nov65/

ORIG REF: 006/

OTH REF: 001

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L 2841-66 EWT(1)/ETC/EPF(n)-2/ENG(m)/EPA(w)-2 LJP(c) AT  
 ACCESSION NR: AP5024126 UR/0185/65/010/009/0960/0968 64  
 AUTHOR: Shapiro, V. D.; Shevchenko, V. I. 58  
 TITLE: Induced scattering of Langmuir oscillations in a plasma within a strong magnetic field 71.44.55  
 SOURCE: Ukrayins'kyi fizychnyy zhurnal, v. 10, no. 9, 1965, 960-968  
 TOPIC TAGS: plasma oscillation, magnetic field plasma effect, plasma electron oscillation, electron scattering  
 ABSTRACT: The present paper studies the nonlinear scattering of Langmuir oscillations on electrons of a plasma in a strong magnetic field. The linear damping of the oscillations is assumed negligibly small. After solving the kinetic equation by means of successive approximations over the oscillation amplitudes, the authors formulate an increment expression for the quantities defining the rate of change in spectral density of oscillations as a consequence of the scattering process. They show also that in contradistinction to the uni-dimensional spectrum case the change in the total energy of plasma oscillations in the strong magnetic field occurs in the lowest order in  $k^2 \lambda_{De}^2$  ( $k \lambda_{De} \ll 1$  for Langmuir oscillations.) Oscillation amplitudes for which the nonlinear energy dissipation becomes substantial.  
 Card 1/2

L 2841-66

ACCESSION NR: AP5024126

tial are also found. "The authors thank Ya. B. Faynberg for valuable remarks."  
Orig. art. has: 23 formulas. <sup>44,55</sup>

ASSOCIATION: Fizyko-tekhnichnyy instytut AN URSR, Khar'kov (Physics-Engineering  
Institute, AN Ukr SSR) <sup>44,55</sup>

SUBMITTED: 22Sep64

ENCL: 00

SUB CODE: ME, NP

NO REF SOV: 008

OTHER: 000

BVK  
Card 2/2

L 5260-86 EWT(1)/ETC/EPF(n)-2/ENG(m)/EPA(w)-2 IJP(c) AT	
ACC NR: AP5026437	SOURCE CODE: UR/0089/65/019/004/0336/0342
AUTHOR: <u>Faynberg, Ya. B.; Shapiro, V. D.</u> <i>44, 85</i>	
ORG: none	
TITLE: Interaction between a modulated beam and a plasma	
SOURCE: Atomnaya energiya, v. 19, no. 4, 1965, 336-342	
TOPIC TAGS: <u>plasma beam interaction</u> , <i>21.44, 85</i> electron beam, plasma instability, beam modulation	
<p>ABSTRACT: A self-consistent analysis is presented of the parametric and two-stream instabilities that can develop in a system comprising a plasma and a modulated electron beam in the form of a periodic sequence of compensated bunches moving through the plasma at constant velocity. The oscillations produced in the system are determined by linearizing the standard set of single-component hydrodynamic equations, which then yield expressions for the perturbations of the plasma-particle density and velocity as well as the electric-field perturbations. The results confirm a hypothesis advanced by one of the authors (Faynberg, Atomnaya energiya v. 11, 313, 1961), that modulation of the electron beam appreciably changes the frequency spectrum and the growth increments of the oscillations excited in the plasma, and also the effective temperatures of the beam and of the plasma, in such a way that certain instability components are suppressed. At the same time, the instability components having the same wavelengths and frequencies as the beam modulation, increase in intensity. "The</p>	
Card 1/2	UDC: 533.9

L 5260-66  
ACC NR: AP5026437

3

authors thank V. I. Kurilko for a discussion of the results." Orig. art. has: 33  
formulas. 44 55 [02]

SUB CODE: ME/PP/SUBM DATE: 28Dec64/ ORIG REF: 007/ OTH REF: 001/ ATD PRESS:  
7/38

PC

Card 2/2

L 00346-66 EWT(1)/EPF(n)-2/ENG(n)/EPA(w)-2 IJP(o) AT

ACCESSION NR: AP5019249

UR/0056/65/049/001/0329/0334

AUTHOR: Bass, F. G.; <sup>44,55</sup>Faynberg, Ya. B.; <sup>44,55</sup>Shapiro, V. D. <sup>568</sup>

TITLE: Quasilinear theory of a weakly turbulent plasma with account of correlation of the electric fields <sup>21,44,55</sup>

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 49, no. 1, 1965, 329-334

TOPIC TAGS: turbulent plasma, plasma beam interaction, plasma electron oscillation, plasma electron temperature, plasma stability

ABSTRACT: Inasmuch as the existing quasilinear theory is based on the premise that the correlation time is infinite, the authors derive the equations for a turbulent plasma with account of the influence of the finite time of correlation of the electric microfields. This approach is shown to be valid for a plasma placed in an external electric field whose phase and amplitude vary at random. The model assumed for the plasma is that proposed by T. H. Stix (MATT-239, Preprint, 1964), wherein the plasma consists of alternating regions in each of which the phase is fixed, but the phase changes from region to region are random. The particular case considered is that of a circularly polarized electromagnetic wave propagating in the direction

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L 00346-66

ACCESSION NR: AP5019249

of the external magnetic field. The nonlinearity of the plasma oscillations is taken into account only by introducing the correlator of the amplitudes of the Fourier components of the electric fields; other effects connected with the nonlinearity of the oscillations are disregarded. It follows from an analysis of the kinetic and Maxwell's equations that energy can be transferred in such a system to nonresonant plasma particles, and that if the correlation time is finite it is possible for the plasma electrons to become heated by the transverse component of the electromagnetic field. The stabilizing effect of such an energy transfer is discussed briefly. Orig. art. has: 24 formulas.

ASSOCIATION: None

SUBMITTED: 25Feb65

ENCL: 00

SUB CODE: ME

NO REF SOV: 003

OTHER: 001

yW  
Card 2/2

FAYNBERG, Ya.B.; SHAPIRO, V.D.

Interaction between a modulated beam and a plasma. Aton.  
energ. 19 no.4:336-342 0 '65. (MIRA 18:11)



L 12004-66 EWT(1)/ETC(f)/EPF(n)-2/ENG(m) IJP(c) AT  
 ACC NR: AP6001774 SOURCE CODE: UR/0386/65/002/010/0469/0473

AUTHOR: Shapiro, V. D. 44, 55

ORG: Physicotechnical Institute, Academy of Sciences UkrSSR, Khar'kov (Fiziko-  
 tekhnicheskii institut Akademii nauk UkrSSR) 44, 55

TITLE: Plasma heating by a stochastic field

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki. Pis'ma v redaktsiyu.  
 Prilozheniye, v. 2, no. 10, 1965, 469-473

TOPIC TAGS: plasma interaction, plasma electromagnetic wave, plasma heating, correlation statistics, plasma acceleration

ABSTRACT: This is a continuation of an earlier investigation of the interaction between plasma particles and an electromagnetic field, with account taken of the finite correlation time of the field Fourier harmonics (F. G. Bass, Ya. B. Faynberg, and V. D. Shapiro, ZhETF v. 49, 329, 1965), where it was shown that a finite correlation time leads to an effective transfer of energy from the field to the plasma particles, whose initial velocity is much smaller than the phase velocity of the waves. In that study the plasma acceleration was investigated only in the initial phase, when the plasma-particle velocities remain lower than the phase velocity of the wave. In the present article the author treats the acceleration of plasma

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L 12004-66

ACC NR: AP6001774

6  
particles to high energies as one particular case of interaction between a plasma and a stochastic field whose harmonics have a finite correlation time. The calculations are made for a circularly polarized electromagnetic wave propagating along an external magnetic field. The particle distribution function is determined and it follows from its form that the interaction with the electromagnetic field produces in the plasma a large number of fast electrons accelerated to high energy. It is noted that if the particles accelerated by the stochastic fields were to be uniformly distributed in velocity space, then the number of high-energy particles would be insignificant, but since they fill in the course of time a rather narrow region in velocity space, the number of particles accelerated to high energies is quite appreciable. Author is grateful to Ya. B. Faynberg for valuable advice, and to B. B. Kadomtsev for a discussion of the work. Orig. art. has: 8 formulas.

44,55  
SUB CODE: 20/ SUBM DATE: 28Sep65/ ORIG REF: 004/ OTH REF: 001

Card

2/2

SHAPIRO, V.D.; SHEVCHENKO, V.I.

Induced scattering of Langmuir oscillations in a plasma placed in  
a high magnetic field. Ukr. fiz. zhur. 10 no.9:960-968 S '65.  
(MIRA 18:9)

1. Fiziko-tekhnicheskiiy institut AN UkrSSR, Khar'kov.

L 28022-66 ACC NR: AP5026448	EWI(1)/ETC(f)/EPF(n)-2/EWG(m) SOURCE CODE: UR/0089/65/019/004/0388/0389	IJP(c) AT 55 54 B
AUTHOR: <u>Kheyfets, M. I.; Shapiro, V. D.</u>		
ORIG: None		
TITLE: Density limitations of interacting currents in the opposite ultra-relativistic streams		
SOURCE: Atomnaya energiya, v. 19, no. 4, 1965, 388-389		
TOPIC TAGS: plasma physics, plasma pinch, plasma stability		
ABSTRACT: The authors discuss the plasma collective <sup>2/</sup> instabilities in the system of two streams having densities $n_1$ and $n_2$ and flowing in opposite directions with relativistic velocities $v_1$ and $v_2$ along the axis y. It was assumed that the electrostatic interaction between two beams was compensated by the beam magnetic repulsion. Thus, the changes in densities were regarded as negligible quantities. Under this assumption, the authors presented first a formula expressing the tensor of dielectric constant and then by using Maxwell equations, obtained the dispersion relation. After assuming that the beam thickness was less than 0.01 cm and $v_1 = c$ and $v_2 = -c$ and on investigating graphically the simplified dispersion relation, the authors derived a formula for the		
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L 28022-66

ACC NR: AP5026448

maximum wave increment  $\text{Im}\omega$ . Thus, the increment growth and time were finally expressed as:

$$\text{Im}\omega = \sqrt{2\Omega_1\Omega_2}; \quad \tau = (2\Omega_1\Omega_2)^{-1/2}$$

Here the root can be determined from the expression:

$$\Omega_i = \frac{4\pi n_i e^2}{m_i} \quad \text{Com-}$$

paring the time with the interaction time, the maximum beam density could be calculated for the case when the instability is negligible. An example of calculation of this density for electron and electron-positron beams was given. The authors thank Ya. B. Faynberg for discussions of results. Orig. art. has: 9 formulas.

SUB CODE: <sup>20</sup>~~NP~~ / SUBM DATE: 18Feb65 / ORIG REF: 001 / OTH REF: 004

Card

2/2

L 10679-66 EWT(d)/EWT(1)/ETC/EPF(R)-2/T/EWP(1)/EWG LJP(c) AT  
ACC NR: AP5028305

SOURCE CODE: UR/0057/65/035/011/1925/1932

AUTHOR: Tsyтович, V.N.; Shapiro, V.D.  
44.55 44.55

ORG: none

TITLE: On the theory of a charged particle beam traversing a plasma

SOURCE: Zhurnal tekhnicheskoy fiziki, v. 35, no. 11, 1965, 1925-1932

TOPIC TAGS: <sup>21, 44, 55</sup> plasma oscillation, plasma beam interaction, particle beam, *plasma wave*  
<sup>16, 44, 55</sup>

ABSTRACT: An analytic solution is obtained in the quasi-linear approximation for the spectral energy density of the oscillations excited in a semi-infinite plasma by a charged particle beam having a narrow velocity distribution incident normally on the plasma surface with a velocity exceeding the phase velocity of the plasma waves. Some results previously obtained from qualitative considerations (Ya.B.Feynberg and V.D.Shapiro, ZhETF, 47, 1389, 1964) are confirmed; in particular, the energy of the excited plasma oscillations is confined largely to a thin layer near the surface, the thickness of which decreases exponentially with time. The case of an incident pulse of charged particles of finite duration is also treated, and expressions are derived for the pulse shape and the energy density of the plasma oscillations after the particles have penetrated deeply into the plasma. The authors thank Ya.B.Feynberg and M.S.Rabinovich for their interest in the work and discussion of the results. Orig. art. has: 28 formulas and 2 figures.

SUB CODE: 20

SUBM DATE: 06Mar65/

ORIG. REF: 005

OTH REF: 000

Card 1/1

57  
B

ACC NR: AI4025638

SOURCE CODE: UR/0386/66/004/001/0032/0036

AUTHOR: Faynberg, Ya. B.; Shapiro, V. D.

ORG: Physicotechnical Institute, Academy of Sciences, Ukrainian SSR (Fiziko-  
tekhnicheskii institut Akademii nauk Ukrainiskoy SSR)

TITLE: Stabilization of low-frequency plasma instabilities

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki. Pis'ma v redaktsiyu.  
Prilozheniye, v. 4, no. 1, 1966, 32-36

TOPIC TAGS: plasma instability, plasma electromagnetics, plasma charged particle,  
dispersion equation

ABSTRACT: The authors consider theoretically the feasibility of stabilizing drift instability of an inhomogeneous plasma by superimposing an external high-frequency electric field parallel to the magnetic field. The change in the drift-wave frequency due to the external field is calculated and is found to increase. The increase in frequency increases in turn the magnitude of the stabilizing term in the expression for the drift-wave growth increment. The range in which this stabilization is effected is determined. From the results of the calculation and also from solution of the dispersion equation for a collisionless drift instability in a high-frequency field it is learned that the width of the interval in which high-frequency stabilization takes place is maximal when the ion Larmor radius tends to zero. With increasing Larmor radius this width decreases and tends to zero for infinite radius. A high-frequency

Card 1/2

L 36246-66

ACC NR: AP6023638

electric field can also stabilize drift instability of a plasma with frequent collisions (drift-dissipative instability), but this calls for larger amplitudes than in the case of a collisionless drift instability. The authors thank B. B. Kadomtsey and A. B. Mikhaylovskiy for a discussion of the results and V. I. Shevchenko for help with the work. Orig. art. has: 8 formulas.

SUB CODE: 20/ SUBM DATE: 08May66/ ORIG REF: 009

Card 2/2 110~



ACC NR: AP6017655 (N) SOURCE CODE: UR/0136/66/000/001/0072/0075

AUTHOR: Shapiro, V. Ya.; Patseruk, A. P.; Kuz'menkov, V. A.; Nikolayeva, M. R. 52  
B

ORG: none

TITLE: New technical lubricants<sup>11</sup> for drawing pipes<sup>18</sup> of aluminum<sup>27</sup> and its alloys

SOURCE: Tsvetnyye metally, no. 1, 1966, 72-75

TOPIC TAGS: lubricant, aluminum alloy, pipe, METAL DRAWING

ABSTRACT: Over 60 compositions of various lubricants for use in drawing pipes of aluminum and its alloys were tested. All the lubricants can be divided into two main groups: (1) compositions including surface active agents (SAA), and (2) compositions based on light mineral oils with various thickening agents. The physicochemical properties of the lubricants and their limit reduction, drawing stress, and burning off during heat treatment were determined. Tests of the lubricants with and without SAA showed that there were no appreciable differences in drawing stresses, which were much higher than when the standard "Vapor T" lubricant is used. Therefore, the lubricants are unsuitable for use under industrial conditions of drawing. However, two lubricants, named VM-17 (85% MS20 aviation oil and 15% of a high molecular compound with a molecular weight of 20000) and VM-25 (81% aviation oil, 4% of the same high molecular compound, and 15% aluminum stearate) were found to produce drawing stresses 16

Card 1/2 UDC: 669.71:621.774.377

ACC NR: AP6017655

0

even lower than "Vapor T" and are recommended for industrial use. Orig. art. has:  
1 figure.

SUB CODE: //, 13/. SUBM DATE: none/ ORIG REF: 005

Card 2/2 11b

ACC NR: AP6018750

SOURCE CODE: UR/0057/66/036/006/1151/1154

AUTHOR: Shapiro, V.D.; Shevchenko, V.I.

ORG: none

TITLE: On a mechanism for stabilization of beam instability

SOURCE: Zhurnal tekhnicheskoy fiziki, v. 36, no. 6, 1966, 1151-1154

TOPIC TAGS: plasma stability, plasma instability, plasma magnetic field, charged particle, electron beam

ABSTRACT: The authors discuss the stability of a plasma filament in a strong magnetic field in the presence of a low density axial electron beam whose diameter is equal to that of the plasma filament. The relevant dispersion equation is written, its roots are discussed, and the condition is derived for the stability of the plasma against low frequency oscillations. It is noted that when the stability condition is nearly but not quite satisfied (the case of "low supercriticality") there arises a nonuniform distribution of the energy density of electrostatic oscillations, which produces an additional force on the electrons that can tend to stabilize the plasma. The effect of the electrostatic oscillation energy density distribution nonuniformity on the plasma stability is discussed quantitatively and the conditions are found under which it can tend to stabilize the plasma. The authors thank Ya.B.Faynberg for discussing the results. Orig. art. has: 18 formulas.

SUB CODE: 20/ SUBM DATE: 20Dec65/ ORIG. REF: 002

Card 1/1/

UDC: 533.951.8

ACC NR: AP7005718

SOURCE CODE: UR/0089/67/022/001/0044/0046

AUTHOR: Shapiro, V. D.

ORG: none

TITLE: Parametric instability in the interaction of plasma with a modulated beam

SOURCE: Atomnaya energiya, v. 22, no. 1, 1967, 44-46

TOPIC TAGS: parametric instability, plasma beam interaction, beam modulation, plasma resonance, *BEAM PLASMA INSTABILITY*

ABSTRACT: The author and a colleague, Ya. B. Faynberg, in a previous paper (Atomnaya energiya, 19, 1965, 336) showed that the beam-plasma interaction can be stabilized by modulating the density of the beam. This, however, may cause the appearance of parametric instability, which occurs when the Langmuir frequency of the plasma approaches  $n/2$  times the modulation frequency of the beam. This type of instability is theoretically analyzed. At exact resonance there is no instability. Near resonance, the relationship between increment values and departure from resonance (detuning) depends on whether the wave number of the investigated plasma wave is close to  $n/2$  times the beam wave number or far from this value, and on whether the electron bunches are short in comparison with the beam wave length. Various cases are derived from the same dispersion equation. The author thanks Ya. B. Faynberg and V. I. Kurilko. Orig. art. has: 17 formulas and 2 figures. [WA-71] [JM]

SUB CODE: 20/ SUBM DATE: 30Jun66/ ORIG REF: 002/  
Card 1/1 UDC: 533.9

ACC NR: AP7006136

SOURCE CODE: UR/0056/67/052/001/0144/0153

AUTHOR: Shapiro, V. D.; Shevchenko, V. I.

ORG: Physicotechnical Institute, Academy of Sciences, Ukrainian SSR (Fiziko-tekhnicheskiy institut Akademii nauk Ukrainiskoy SSR)

TITLE: Contribution to the nonlinear theory of stability of an electron beam in a system with electrodes

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 52, no. 1, 1967, 144-153

TOPIC TAGS: <sup>beam</sup>plasma instability, nonlinear theory, plasma beam interaction, <sup>electron beam, electron beam stability, plasma oscillation</sup>electron beam  
 ABSTRACT: The article deals with the nonlinear theory of the instability first considered by J. R. Pierce (J. Appl. Phys. v. 15, 721, 1944), produced when a monoenergetic electron beam passes between electrodes kept at constant potential. Small supercriticality is assumed. The method used in the analysis is the same as used by one of the authors (Shapiro, Izv. Vuzov Radiofizika v. 7, 736, 1964) for a beam with periodically varying parameters. The plasma oscillations are described by means of the hydrodynamic equations, which are solved subject to the same boundary conditions as imposed by Pierce. The solution of these equations yields the complex amplitude of the instability oscillations and a critical velocity is introduced to differentiate between oscillations that can be stabilized and those that can not. It is concluded that the system possesses "hard" excitation, so that when it goes through the stabili-

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ACC NR: AP7006136

ty limit the amplitudes of the oscillations increase abruptly to values comparable with the initial energy of the beam. At these amplitudes the instability can become of the multiple-stream type, and then the approximations used in the present paper are no longer valid. The possible existence of stationary solutions of the equations at large amplitudes is also considered and it is concluded that there are none. The authors thank Ya. B. Faynberg for calling their attention to this group of problems, and B. D. Kadomtsev and G. Ya. Lyubarskiy for valuable advice. Orig. art. has: 41 formulas. [WA-67-71]

SUB CODE: 20/ SUBM DATE: 14 Jun 66/ ORIG REF: 011/ OTH REF: 003

Card 2/2

S/056/62/042/003/008/049  
B104/B102

AUTHORS: Fam Zuy Khuyen, Shapiro, V. G., Shpinel', V. S.

TITLE: Resonance scattering of  $\gamma$ -quanta in  $\text{Te}^{125}$

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 42,  
no. 3, 1962, 703 - 706

TEXT: The resonance of 35.5-keV  $\gamma$ -rays emitted from  $\text{Te}^{125\text{m}}$  was studied.  $\text{Te}^{125\text{m}}$  was obtained from neutron-bombarded metallic tellurium enriched in  $\text{Te}^{124}$  up to 86%. The  $\text{TeO}_2$  obtained was used to produce sources of 20  $\text{mg/cm}^2$  thickness. A  $\text{TeO}_2$  layer enriched in  $\text{Te}^{125}$  to 92% and applied onto an aluminum base served as scatterer. A luminescence spectrometer recorded the X-radiation from the scatterer. This radiation contained also resonance-scattered  $\gamma$ -quanta and the non-resonance-scattered radiation from the scatterer, the base, the shield, etc. The pulses from the photomultiplier (Fig. 2) were fed into two scaling circuits over an amplifier and a single-channel discriminator. One of these circuits

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S/056/62/042/003/008/049  
B104/B102

Resonance scattering of...

operated when the source moved toward the scatterer, the other one when it moved in the opposite direction. Both circuits were switched off when the direction changed. A Mössbauer effect was observed. The probabilities of a recoil-free emission and for absorption of a  $\gamma$ -quantum from  $\text{TeO}_2$  were  $0.12 \pm 0.03$  at  $-190^\circ\text{C}$  and  $0.067 \pm 0.008$  at room temperature.

The half-life of  $(1.4 \pm 0.2) \cdot 10^{-9}$  sec of the 35.5-kev level (Fig. 1) agrees with results obtained by the method of delayed coincidences. A. A. Sorokin is thanked for discussions, and L. A. Bykovskaya, student, for assistance. There are 4 figures, 1 table, and 4 references: 2 Soviet and 2 non-Soviet. The two references to English-language publications read as follows: E. Cotton, J. Phys. Rad., 21, 265, 1960; R. Graham, R. Bell, Can. J. Phys., 31, 377, 1953.

ASSOCIATION: Institut yadernoy fiziki Moskovskogo gosudarstvennogo universiteta (Institute of Nuclear Physics of the Moscow State University)

SUBMITTED: October 2, 1961

Card 2/3



Resonance scattering of...

S/056/62/042/003/008/049  
B104/B102

Fig. 1.  $\text{Te}^{125m}$  decay scheme.

Fig. 2. Experimental arrangement.

Legend: (1) Source; (2) scatterer, in an NaI(Tl) detector crystal, (3); (4) lead collimator; (5) lead plate; (6) background filter; (7) black paper.

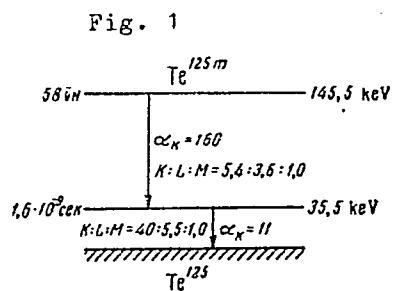
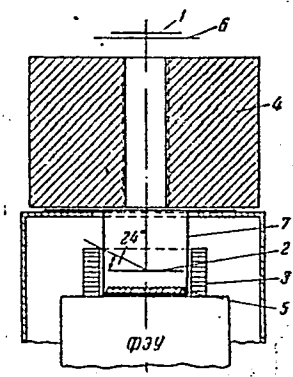


Fig. 2



Card 3/3

S/056/62/043/003/009/063  
B125/B102

AUTHORS: Alekseyevskiy, N. Ye., Fam Z. Kiyen, Shapiro, V. G.,  
Shpinel', V. S.

TITLE: Anisotropy of the Mössbauer effect in a  $\beta$ -Sn single crystal

PERIODICAL: Zhurnal experimental'noy i teoreticheskoy fiziki, v. 43,  
no. 3(9), 1962, 790 - 794

TEXT: The resonance absorption probability  $f$  of 23.8 keV  $\gamma$ -quanta in white tin was studied at 77°K and 293°K. The lamellar absorbers, about 57.5 mg/cm<sup>2</sup> thick, were cut out from  $\beta$ -Sn single crystals in the (001), (101) and (100) planes. The trial measurements were made with a polycrystalline tin foil. The  $\gamma$ -quantum sources, consisting of Sn<sup>119m</sup> nuclei in SnO<sub>2</sub> (88% Sn<sup>118</sup>; ~5 mg/cm<sup>2</sup> thick), were irradiated in a reactor. In all experiments the source was kept at room temperature. The figure shows three spectra taken at 77°K under identical geometrical conditions. Probably because of quadrupole interaction, the half-widths of the lines observed are greater than the theoretical half-widths if allowance is

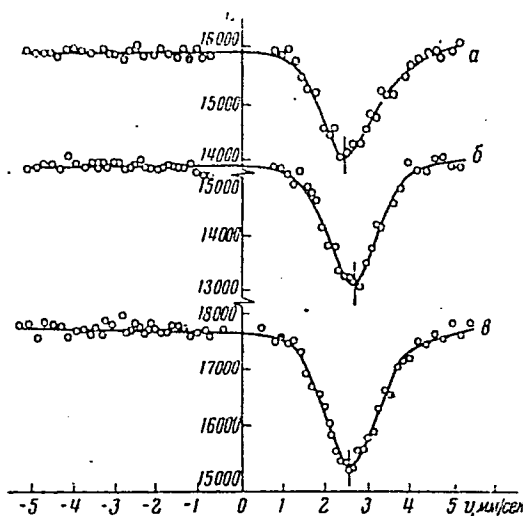
Card 1/3

Anisotropy of the Mössbauer...

S/056/62/043/003/009/063  
B125/B102

SUBMITTED: April 4, 1962

Fig. Absorption spectra  
taken at 77°K for plates  
with different orientations  
a - (001), b - (100),  
c - polycrystal. The thin  
vertical lines show the  
positions of the absorption  
maxima.



Card 3/3

FAM ZUY KHUYEN; SHAPIRO, V.G.; SHPINEL', V.S.

Resonance scattering of  $\gamma$ -quanta in  $\text{Te}^{125}$ . Zhur.eksp.i teor.fiz.  
42 no.3:703-706 Mr '62. (MIRA 15:4)  
(Gamma rays--Scattering) (Tellurium--Isotopes)

ALEKSEYEVSKIY, N.Ye.; FAM ZUI KHIYEN; SHAPIRO, V.G.; SHPINEL', V.S.

Anisotropy of the Mössbauer effect in  $\beta$ -tin single crystals.  
Zhur. eksp. i teor. fiz. 43 no.3:790-794 ' 62. (MIRA 15:10)

1. Institut yadernoy fiziki Moskovskogo gosudarstvennogo universiteta.  
(Mössbauer effect) (Tin crystals)



BR

ACCESSION NR: AP4042552

S/0056/64/046/006/1960/1963

AUTHORS: Shapiro, V. G.; Shpinel', V. S.

TITLE: Anisotropy of the Mossbauer effect in Beta-tin and cassiterite single crystals

SOURCE: Zh. eksper. i teor. fiz., v. 46, no. 6, 1964, 1960-1963

TOPIC TAGS: Mossbauer effect, tin, tin compound, resonance absorption, absorption spectrum

ABSTRACT: The resonance absorption of 23.8-keV gamma quanta in single-crystal specimens of  $\beta$ -Sn and cassiterite ( $\text{SnO}_2$ ) were investigated at different temperatures to ascertain the anisotropy of the probability of resonance absorption of the gamma quanta. The measurements were made with apparatus described previously (Fam Zuy Khiyen, V. G. Shapiro, V. S. Shpinel', ZhETF v. 42, 703, 1962), in which the absorber could be moved at constant speed and the counting

Card 1/5

ACCESSION NR: AP4042552

still inconclusive. "The authors are grateful to N. Ye. Alekseyevskiy for participating in a discussion of the results and for supplying the single-crystal tin, to G. P. Barsanov, director of the Mineralogical Museum of AN SSSR, for the single-crystal cassiterite, and to P. M. Shal'nev for help with the manufacture of the single-crystal  $\text{SnO}_2$  absorbers." Orig. art. has: 3 figures and 2 tables.

ASSOCIATION: Institut yadernoy fiziki Moskovskogo gosudarstvennogo universiteta (Nuclear Physics Institute, Moscow State University)

SUBMITTED: 30Dec63

DATE ACQ:

ENCL: 02

SUB CODE: NP

NR REF SOV: 004

OTHER: 002

Card 3/5



ACCESSION NR: AP4042552

ENCLOSURE: 01

Resonance absorption probability  $f'$  and  $\epsilon = [N(\infty) - N_{\min}] / N(\infty)$  for two orientations

1 Ориента- ции	293° К		470° К		635° К		810° К	
	$\epsilon$	$f'$	$\epsilon$	$f'$	$\epsilon$	$f'$	$\epsilon$	$f'$
(001)	20,0	$0,69 \pm 0,07$	19,6	$0,55 \pm 0,06$	18,3	$0,46 \pm 0,05$	14,7	$0,30 \pm 0,03$
(110)	18,0	$0,54 \pm 0,05$	17,1	$0,45 \pm 0,05$	15,4	$0,36 \pm 0,04$	12,1	$0,22 \pm 0,02$

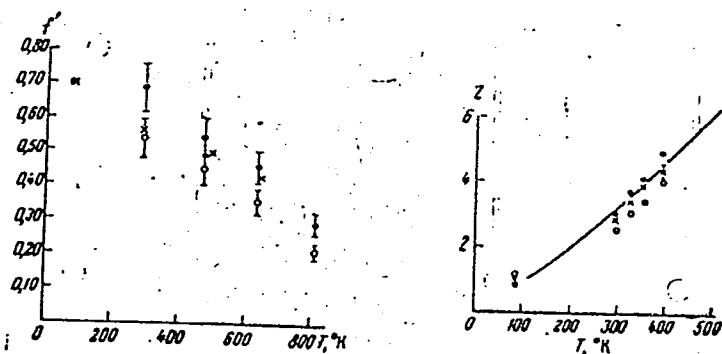
Ориентация 1	2 Значения $f'$			
	293° К	323° К	353° К	393° К
3 Поликристалл	$0,060 \pm 0,006$	$0,033 \pm 0,003$	$0,020 \pm 0,002$	$0,013 \pm 0,001$
(001)	$0,058 \pm 0,006$	$0,027 \pm 0,003$	$0,016 \pm 0,002$	$0,008 \pm 0,001$
(110)	$0,085 \pm 0,009$	$0,049 \pm 0,005$	$0,034 \pm 0,003$	$0,018 \pm 0,002$

1 - orientation, 2 - values of  $f'$ , 3 - polycrystal

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ACCESSION NR: AP4042552

ENCLOSURE: 02



Temperature dependences of resonance absorption probability (left) and Debye factor (right) for  $\text{SnO}_2$  and  $\beta\text{-Sn}$  of different orientations

Card 5/5

SHAPIRO, V. I.

Distr: 4E4J/4E2c

Gravimetric determination of cadmium with *p*-anisidine.  
M. B. Burdun and V. I. Shapiro. *Uchenye Zapiski Kazansk. Univ.* 14, 123-8 (1954); Referat. *Zhur., Khim.* 1955, Abstr. No. 55337. — The reaction of  $\text{CdSO}_4$  and *p*-anisidine results in the complex  $(\text{Cd}(\text{NH}_2\text{C}_6\text{H}_4\text{OCH}_3)_2\text{SO}_4)$  which can be used for gravimetric detn. of Cd. To a sample contg. 0.1-1.0M soln. of  $\text{CdSO}_4$  (after sepg. interfering elements) heated to near boiling temp., add alc. soln. of *p*-anisidine (1.5 times the theoretical amt.). Filter the white cryst. complex ppt. through a no. 2 crucible, wash with alc. (the washing is continued until no crimson color appears when HCl-acidified soln. of  $\text{K}_2\text{Cr}_2\text{O}_7$  is added), dry 15-20 min. at 105-110°, and weigh. To det. Cd from a 0.01M  $\text{CdSO}_4$  soln., add 3-fold (by vol.) amt. of the reagent and let ppt.  $\text{Zn}^{++}$ ,  $\text{Cu}^{++}$ ,  $\text{Pb}^{++}$ ,  $\text{Fe}^{+++}$ ,  $\text{Ce}^{++}$ ,  $\text{Cl}^-$ ,  $\text{VO}_3^-$ ,  $\text{MnO}_4^-$ , and  $\text{Cr}_2\text{O}_7^{--}$  interfere.  $\text{NO}_3^-$  (in the presence of  $\text{SO}_4^{--}$ ) and  $\text{Mg}^{++}$  do not interfere. N. Vasiloff

DM Jln //

YAGDIN, M.B.; SHAPIRO, V.I.

Polarographic behavior of rhodium on a rotating platinum  
microdisk electrode. Uch.zap.Kish.un. 68:64-70 '63 (cover  
'64). (NIRA 18:12)

1. Kishinevskiy gosudarstvennyy universitet.

L 27996-66 EWA(h)/EWT(1) GW

ACC NR: AT6005987

(N)

SOURCE CODE: UR/3169/65/000/001/0087/0105

AUTHOR: Lebedev, T. S. (Candidate of geological-mineral sciences); Shapoval, V. I.;  
Savenko, B. Ya. 49  
48  
B+1

ORG: none

TITLE: Physical properties of bottom deposits in the equatorial belt of the Atlantic Ocean

SOURCE: AN UkrSSR. Geofizicheskiy sbornik, no. 1(12), 1965. Stroyeniye zemnoy kory i fizicheskiye svoystva gornyykh porod (Structure of the earth's crust and physical properties of rocks), 87-105 12

TOPIC TAGS: ocean dynamics, longitudinal wave, shock wave propagation , ocean property

ABSTRACT: Elastic, electrical, and magnetic properties of samples collected during the XV voyage of the Mikhail Gomonosov research vessel in the western Atlantic are investigated. Using the formula 12

$$V_{Li} = \sqrt{\frac{E(1-\sigma)}{\rho(1+\sigma)(1-2\sigma)}} \quad 12$$

and certain corrections (taking into consideration the finite dimensions of the medium) the propagation velocities of longitudinal waves ( $V_L$ ) were evaluated, where  $V_{Li}$  2

Card 1/2

L 27996-66

ACC NR: AT6005987

is the velocity of propagation of longitudinal waves in an infinite medium,  $E$  is Young's modulus,  $\rho$  is the sample density, and  $\sigma$  is the Poisson coefficient. The electrical resistivity of the sample was investigated using the formula

$$R_k = R - \frac{\rho_0}{S_1} (L - l),$$

and some additional concepts where  $R_k$  is the resistivity of the sample,  $R$  is the resistivity of both the sample and the solution,  $L$  is the distance between two electrodes,  $l$  is the sample length and  $S_1$  is the cross section of the solution column. The measurement apparatus consisted of 2 electrodes and used an alternating current of 1000 cps. Magnetic susceptibilities of all collected samples were investigated by using a balanced H-shaped magnetic bridge as a pickup. The data show that 1) longitudinal ( $P_L$ ) waves of samples saturated with ocean water have a propagation velocity

of 1300-1600 m/sec and that the propagation velocities for grayish ooze, white ooze and yellowish foraminiferal ooze are 1580, 1510 and 1450 m/sec, respectively; 2) the resistivities of bottom deposits in the western equatorial belt of the Atlantic are dependent mainly on the lithologic and mechanical properties of the deposits varying from 0.5-0.9  $\Omega$ . The foraminiferal ooze, however, has resistivities up to 9 $\Omega$ ; 3) the magnetic susceptibilities of the bottom deposits vary from  $1-40 \cdot 10^{-6}$  CGSM; and 4) the vibratory motions of the ship affect the reliability of seismic evaluations. Orig. art. has: 2 tables, 7 figures. 12

SUB CODE: 08/

SUBM DATE: 29Aug64/

ORIG REF: 018/

OTH REF: 012

Card 2/2

RODIN, PAV, Mikhail Grigor'yevich; SHAPIRO, V.M., red.

[Adrenal glands and reanimation] Nadpochecznyki i reanimatsiia. Moskva, Meditsina, 1964. 159 p. (MIRA 17:8)

19-10-1, 19-10-2 (19-10-1)

are not to be used in any way for the purpose of the above-mentioned  
information. This information is to be used for the purpose of the  
information, which is to be used for the purpose of the above-mentioned  
information. (M 34 17-8)



SHAPIRO, V.M.; NIKITINA, S.S.; VOLKOVA, A.D.

Effect of intravenous introduction of sodium bicarbonate on the acid-base equilibrium and gases in the blood during direct cardiac massage. Pat. fiziol. i eksp. terap. 8 no.1:29-33 Ja-F '64.

(MIRA 18:2)

1. Laboratoriya eksperimental'noy fiziologii po ozhivleniyu organizma (zav.- prof. V.A. Negovskiy) AMN SSSR, Moskva.

SHAPIRO, V.M. (Moskva)

Conference on problems of reanimatology dedicated to Professor  
F.A. Andreev's memory. Pat. fiziol. i eksp. terap. 8 no.1:  
85-86 Ja-F '64. (MIRA 18:2)

KOZAKOV, A.Ya., inzh.; SHAPIRO, V.N., inzh.

Experimental building of apartment houses in Moscow. Stroi.prom.  
36 no.4:6-10 Ap '58. (MIRA 11:4)  
(Moscow--Apartment houses)

24-58-3-8/38

AUTHOR: Forsman, N. A. (Moscow)

TITLE: Approximate Determination of the Stress Concentration in a Notched Elastic Bar Under Tension (Priblizhennoye opredeleniye kontsentratsiy napryazheniy v rastyanutom uprugom sterzhne s vytochkoy)

PERIODICAL: Izvestiya Akademii Nauk SSSR, Otdeleniye Tekhnicheskikh Nauk, 1953, Nr 3, pp 73-81 (USSR)

ABSTRACT: The problem is solved for the circular and rectangular cross-sections. For the circular cross-section a variational method was suggested by V. S. Shapiro ("Certain problems of the deformation of bars of variable cross-section", Prikl. Mat. i Mekh. 1953, Nr 2). The stress concentration is assumed to be moderate when the radius of curvature at the groove bottom is of the same order as the radius of the bar at that point. Under this condition it was possible to retain only the first term of the series used in this method. Two ways of solving the problem are shown, namely, the solution of an ordinary non-homogeneous differential equation of the fourth order in the stress function and the substitution of

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24-53-3-8/38

Approximate Determination of the Stress Concentration in a Notched Elastic Bar Under Tension.

an exponential function for the stress function. The coefficients of this exponential function are found from the condition of minimum potential energy. The second method is used to work out a numerical example of a bar with a hyperbolic groove. In this instance, a comparison can be made with the exact solution given by Neuber (Table 1, bracketed values). It is found that, when the radii defined earlier are equal, the most important axial stress is computed by the present method with an accuracy of about 10% whilst the tangential and normal radial stresses, of less importance, are obtained less accurately. Another artifice is used for the analysis of stress concentrations in a notched bar of rectangular cross-section. The method is based on **Neyber** and on Sadowsky, M., and Sternberg, E.J. ("Three-Dimensional Solution for the Stress Concentration round a Circular Hole in a Plate of Arbitrary Thickness", J.Appl.Mech.1949, Nr 1). The approximate solution of the three-dimensional problem is obtained by the superposition of three solutions: (1) the **Neyber** solution for the two-dimensional problem with a hyperbolic notch, (2) correction terms to account for the three-dimensional nature of the problem and (3) solution of a

Card 2/3

24-58-3-8/38

Approximate Determination of the Stress Concentration in a Notched Elastic Bar Under Tension.

residual problem introduced by the fact that the correction terms violate the boundary conditions at the free surface of the notch. Tests were carried out with rubber samples and the results of measurements compared with computations by the methods presented here (Table 4). Agreement within 5% has been achieved. There are 7 illustrations, 4 tables, 1 English and 3 Soviet references.

SUBMITTED: September 5, 1957.

1. Bar--Tension 2. Stresses--Determination

Card 3/3

SHAPIRO, V.S.

Primary liver cancer in children of mothers with Botkin's disease during pregnancy. Sov.med. 22 no.8:42-47 Ag '58 (MIRA 11:10)

1. Iz Serpukhovskoy bol'nitsy "Krasnyy Tekstil'shchik" (glavnyy vrach Ya.G. Syrkin).

(LIVER, NEOPLASMS, in inf. & child.

primary, in child. of mothers with infect. hepatitis in pregn. (Rus))

(HEPATITIS, INFECTIOUS, in pregn.

relation to primary liver cancer in inf. (Rus))

(PREGNANCY, compl.

infect. hepatitis, relation to primary liver cancer in inf. (Rus))

AYZENSHEYN, M.S.; LUNTS, R.I.; NOVIKOVA, R.S.; SHAPIRO, V.S.

Combination of adenomatosis and tuberculosis of the lungs. Probl.  
tub. 38 no.7:43-48 '60. (MIRA 14:1)

1. Iz Moskovskoy klinicheskoy infektsionnoy bol'nitsy No.1  
(glavnyy vrach - zasluzhennyy vrach RSFSR N.G. Zaleskver)  
i Moskovskoy gorodskoy klinicheskoy tsentral'noy tuberkulez-  
noy bol'nitsy (glavnyy vrach - zasluzhennyy deyatel' nauki  
prof. V.L. Eynis).  
(TUBERCULOSIS) (LUNGS---TUMORS)



PIROGOVA, Ye.P.; SHAPIRO, V.S.

Wegner's granulomatosis. Vest. otorin. 22 no.6:51-62 '60.  
(MIRA 14:1)  
1. Iz patologoanatomicheskogo otdeleniya (nauchnyy rukovoditel' -  
prof. A.P. Avtsyn, zav. - dotsent T.G. Terekhova) Moskovskoy  
gorodskoy klinicheskoy infektsionnoy bol'nitsy No.1.  
(RESPIRATORY TRACT--DISEASES)

ZIL'BER, L.A.; SHAPIRO, V.S.; GARDASH'YAN, A.M.; MITROFANOV, V.M.

Mouse cysts produced by the administration of extracts of  
adenomatous pulmonary tissue from sheep. Vop.virus. 7 no.3:  
288-291 My-Je'62. (MIRA 16:8)

1. Institut epidemiologii i mikrobiologii imeni N.F.Gamalei,  
Moskva i Kirgizskiy sel'skokhozyaystvennyy institut imeni  
K.I.Skryabina, Frunze.  
(CYSTS) (TUMORS--TRANSPLANTATION)

IRLIN, I.S.; SHAPIRO, V.S.

Malignant degeneration of the epithelium induced in vitro  
by polyoma virus. Vop. virus. 7 no.3:366-367 My-Je'62.

(MIRA 16:8)

1. Institut epidemiologii i mikrobiologii imeni N.F.Gamalei  
AMN SSSR, Moskva.

(VIRUSES) (TISSUE CULTURE) (EPITHELIUM—CANCER)

25(5)

SOV/119-59-9-12/19

AUTHORS:

Gordon, M. M., Engineer, Proskuryakov, Ye. T., Engineer,  
Shapiro, V. V., Engineer

TITLE:

The Measurement of the Consumption of Bituminous Coal Tar by  
Means of a Pulse Ultrasonic Consumption Indicator

PERIODICAL:

Priborostroyeniye, 1959, Nr 9, pp 24-25 (USSR)

ABSTRACT:

The first figure shows a schematic section of the primary element of the tar consumption indicator. This primary element is fitted into the tar conveyer tube in such a manner that the whole tar to be measured flows through the channel of the primary element. 4 piezo elements (quartz crystals) are attached to the front orifice of the channels. Two of them transmit ultrasonic pulses and the other two receive these pulses. The construction of the primary element is discussed then. Both channels are bored into a metal rod, which warrants good heat exchange between the channels. The block diagram of the electronic part of the apparatus is also given in the first figure. Thereafter the operating mode of the apparatus is discussed. The ultrasonic pulse is recorded by a quartz and converted into an electric pulse. The electric pulse is then amplified, synchronizes a

Card 1/3

The Measurement of the Consumption of Bituminous Coal Tar by Means of a Pulse Ultrasonic Consumption Indicator SOV/119-59-9-12/19

blocking generator, which emits a strong pulse voltage. These blocking generators are described in brief. The unit of the tar volume (a certain difference  $d_f$  between two frequencies) does on principle not depend on the velocity of sound. Thus the unit has no relation whatever to the physical properties of the fluid, especially not to its temperature. Actually a certain dependence on the physical properties of the fluid remains. A diagram illustrates the computed displacement curves of the zero point of the apparatus as a function of the temperature of the fluid for varying distances between the quartzes of each pair. The error caused by differences in temperature may be neglected, if the error in arrangement of the quartzes does not exceed 0.1 mm. In the apparatus described here the two quartz pairs are mounted in different channels. A further figure gives the diagram of an instrument for indicating the tar consumption during ignition of the flares of a gas heated open-hearth furnace. In the next figure the photograph of a drop of anthracene oil taken under a microscope is shown. Evidently anthracene oil is not a homogeneous fluid, since it contains solid particles and

Card 2/3

The Measurement of the Consumption of Bituminous SOV/119-59-9-12/19  
Coal Tar by Means of a Pulse Ultrasonic Consumption Indicator

inclusions of liquid. The primary element of the apparatus must be mounted in the heated container so as to prevent a temperature drop below 50° C during periods of low consumption. The apparatus (precision degree 2) has a linear scale for the reading range 100 - 1000 kg/h can but also be produced with a smaller scale range. There are 6 figures and 3 references, 2 of which are Soviet.

Card 3/3

SKERSKIY, K.K.; SOBOLEV, S.K.; SHAPIRO, V.V.

Simple converter of voltage to pulse frequency. Priborostroenie  
no.11:26-28 N '62. (MIRA 15:12)  
(Electronic calculating machines)

SOV/136-58-10-15/27

AUTHORS: Ratner, R.I. and Shapiro, V.Ya.

TITLE: Pickling Cupronickel in Sulphuric-acid Solution with  
Addition of Ferric Sulphate (Travleniye mel'khiora  
v sernokislom rastvore s dobavkoy sul'fata okisi zheleza)

PERIODICAL: Tsvetnyye Metally, 1958, Nr 10, pp 70 - 73 (USSR)

ABSTRACT: Cupronickel is normally pickled in a mixture of sulphuric and nitric acid with hexavalent chromium as an oxidising agent, but this has disadvantages. At the Revdinskiy zavod obrabotki tsvetnykh metallov (Revdia Non-ferrous Metals Treatment Works) an investigation was carried out to find a better pickling liquid. After laboratory tests had shown almost all the preparations recommended in the Soviet literature (Refs 1-3) to have disadvantages, the work was extended to sulphuric acid containing ferric sulphate. The sulphuric acid removes the outer scale and the ferric ions oxidise the copper and nickel and cause their solution. The tests were carried out with 3-30%  $H_2SO_4$  and 40-200 g/litre of  $Fe_2(SO_4)_3$  at 16 - 100 °C. 50 - 70 °C was found to be the best temperature (Figure 1), securing a sufficiently rapid solution without evaporation losses. The reduction of

Card 1/2



Pickling Cupronickel in Sulphuric-acid Solution with Addition of  
Ferric Sulphate

SOV/136-58-10-15/27

ferric-ion concentration with increasing quantity of pickled metal varies to the same extent per unit surface (Figure 2). The relative decrease in sulphuric acid concentration remained the same for all solutions tested (Figure 3). The optimal sulphuric-acid and ferrous sulphate concentrations were found to be 10-20% and 40-120 g/litre, respectively, giving a pickling time of 7-10 min, with fresh solution. In works tests, surface quality was found to be better than with chromic reagents; laboratory tests showed metal losses to be lower. The authors regret that the adoption of this superior method is hampered by lack of commercial ferric sulphate. Solutions of this type were found to be applicable also to nickel and stainless steel. There are 3 figures and 6 references, 5 of which are Soviet and 1 English.

ASSOCIATION: Revdinskiy zavod obrabotki tsvetnykh metallov  
(Revda Non-ferrous Metals Treatment Works)

Card 2/2

AUTHORS: Shapiro, v.Ya. and Pavlov, A.A.

136-11-10/17

TITLE: Determining Certain Relationships in Connection With Tube Drawing on a "Floating" Mandrel (Opredeleniye nekotorykh sootnosheniy pri volochenii trub na "plavayushchey" opravke)

PERIODICAL: Tsvetnyye Metally, 1957, no.11, pp. 54 - 60 (USSR).

ABSTRACT: In the method dealt with in this article, an unattached mandrel is placed in the tube being drawn, the mandrel shape being such that it stays in the deformation zone. Reference is made to the work of Orro (Ref.5), described as the most detailed available on such methods. The present article consists mainly of an account of experiments in which Yu.W. Timinskiy participated at the Revdinskiy non-ferrous metals treatment works. The object of the first part of the experimental work was to determine the conditions under which the floating-mandrel process will operate without tearing or idle passes to give tubes with a good inner surface. The factors studied were the dimensions of the tubes drawn and mandrel shape and size. The equation deduced was used to calculate drawing conditions in a concrete case and the possibility of reducing the number of different mandrels required and of using different billet dimensions was studied. The results obtained suggested that it might be possible to draw thick-walled tubes, but further data are

Card 1/2

156-11-10/17

Determining Certain Relationships in Connection With Tube Drawing  
on a "Floating" Mandrel.

necessary. For ordinary tubes of copper or copper-zinc alloy, the work established the suitability of the "floating" mandrel technique. The external diameter of the finished tube must be equal to the internal diameter of the billet + approximately 1 mm and it was on this basis that the authors calculated drawing conditions. It was found that the length of the cylindrical part of the mandrel had no appreciable effect on the drawing process, but the angle of inclination of the generatrix of the cone of the mandrel should not exceed that of the generatrix of the die cone. There are 8 figures and 5 Russian references.

ASSOCIATION: ~~Revda Plant for Treatment of Non-ferrous Metals~~ (Revdinskiy zavod po obrabotke tsvetnykh metallov)

AVAILABLE: Library of Congress

Card 2/2      1. Tubes-Drawing    2. Mandrels-Applications

ANISIMOV, A.V.; SHAPIRO, V.Ya.

Device for the determination of linear displacements of  
self-adjusting tube mandrels in the center of deformation.  
Izv. vys. ucheb. zav.; tsvet. met. 4 no.4:149-155 '61.

(MIRA 14:8)

1. Krasnoyarskiy institut tsvetnykh metallov, kafedra  
obrabotki metallov davleniyem.  
(Pipe mills) (Electric measurements)